TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (U-MOSII)

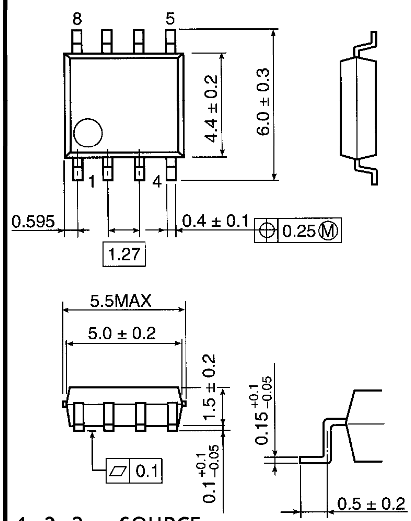
TPC8006-H

LITHIUM ION BATTERY APPLICATIONS
NOTE BOOK PC, PORTABLE EQUIPMENTS APPLICATIONS
HIGH SPEED AND HIGH EFFICIENCY DC-DC CONVERTERS

INDUSTRIAL APPLICATIONS

Unit in mm

SOP-8



1, 2, 3 SOURCE
4 GATE
5, 6, 7, 8 DRAIN

JEDEC	—
EIAJ	—
TOSHIBA	2-6J1A

- High Speed Switching : 60% speed up (compare with current type)
- Small Gate Charge : Q_g = 16 nC (Typ.)
- Low Drain-Source ON Resistance : $R_{DS(ON)}$ = 19 mΩ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}|$ = 8.8 S (Typ.)
- Low Leakage Current : I_{DSS} = 10 μA (Max.) (V_{DS} = 30 V)
- Enhancement-Mode : V_{th} = 1.3~2.5 V (V_{DS} = 10 V, I_D = 1 mA)

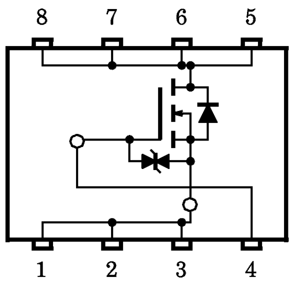
MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	30	V
Drain-Gate Voltage (R_{GS} = 20kΩ)		V_{DGR}	30	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	DC	I_D	7	A
	Pulse	I_{DP}	28	A
Drain Power Dissipation*** (Ta = 25°C)		P_D	2.4	W
Single Pulse Avalanche Energy**		E_{AS}	63.7	mJ
Avalanche Current		I_{AR}	7	A
Repetitive Avalanche Energy*		E_{AR}	0.24	mJ
Channel Temperature		T_{ch}	150	°C
Storage Temperature Range		T_{stg}	−55~150	°C

THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Ambient***	$R_{th(ch-a)}$	52.1	°C / W

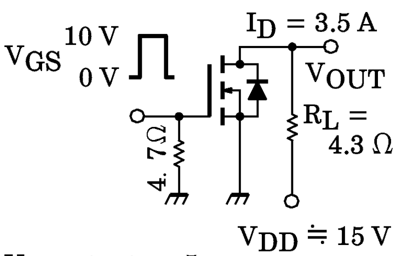
CIRCUIT CONFIGURATION



Note ;
* Repetitive rating ; Pulse Width Limited by Max. Junction Temperature.
** V_{DD} = 24 V, T_{ch} = 25°C (initial), L = 1.0 mH, R_G = 25 Ω, I_{AR} = 7 A
*** Drive operation ; Mount on glass epoxy board [1 inch^2 × 0.8 t] (t = 10 s)

This transistor is an electrostatic sensitive device. Please handle with caution.

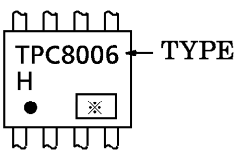
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 16\ V$, $V_{DS} = 0\ V$	—	—	±10	μA
Drain Cut-Off Current	I_{DSS}	$V_{DS} = 30\ V$, $V_{GS} = 0\ V$	—	—	10	μA
Drain-Source Breakdown Voltage	$V_{(BR)\ DSS}$	$I_D = 10\ mA$, $V_{GS} = 0\ V$	30	—	—	V
	$V_{(BR)\ DSX}$	$I_D = 10\ mA$, $V_{GS} = -20\ V$	15	—	—	V
Gate Threshold Voltage	V_{th}	$V_{DS} = 10\ V$, $I_D = 1\ mA$	1.3	—	2.5	V
Drain-Source ON Resistance	$R_{DS\ (ON)}$	$V_{GS} = 4.5\ V$, $I_D = 3.5\ A$	—	29	40	mΩ
		$V_{GS} = 10\ V$, $I_D = 3.5\ A$	—	19	27	mΩ
Forward Transfer Admittance	$\|Y_{fs}\|$	$V_{DS} = 10\ V$, $I_D = 3.5\ A$	4.4	8.8	—	S
Input Capacitance	C_{iss}	$V_{DS} = 10\ V$, $V_{GS} = 0\ V$, f = 1 MHz	—	790	—	pF
Reverse Transfer Capacitance	C_{rss}		—	110	—	pF
Output Capacitance	C_{oss}		—	290	—	pF
Switching Time — Rise Time	t_r	 V_{IN} : t_r, $t_f < 5\ ns$ Duty ≦ 1%, $t_w = 10\ \mu s$	—	5	—	ns
Switching Time — Turn-On Time	t_{on}		—	13	—	ns
Switching Time — Fall Time	t_f		—	8	—	ns
Switching Time — Turn-Off Time	t_{off}		—	36	—	ns
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q_g	$V_{DD} \fallingdotseq 24\ V$, $V_{GS} = 10\ V$, $I_D = 7\ A$	—	16	—	nC
Gate-Source Charge	Q_{gs}		—	12	—	nC
Gate-Drain ("Miller") Charge	Q_{gd}		—	4	—	nC

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	7	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	28	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = 7\ A$, $V_{GS} = 0\ V$	—	—	−1.2	V

MARKING

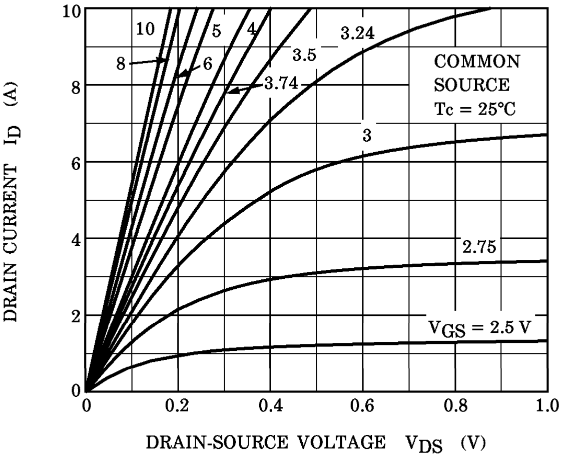


※ Lot Number

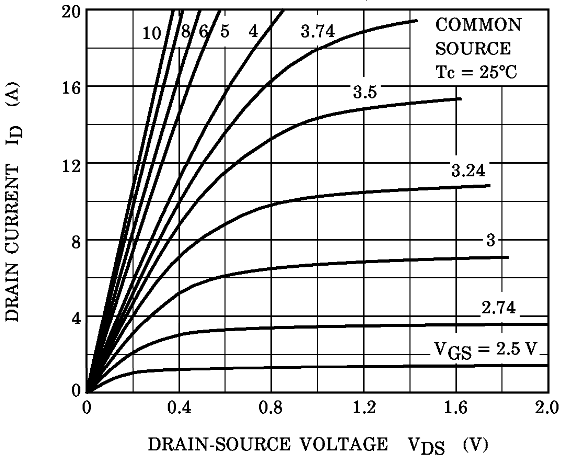
□ □— Month (Starting from Alphabet A)

└— Year (Last Number of the Christian Era)

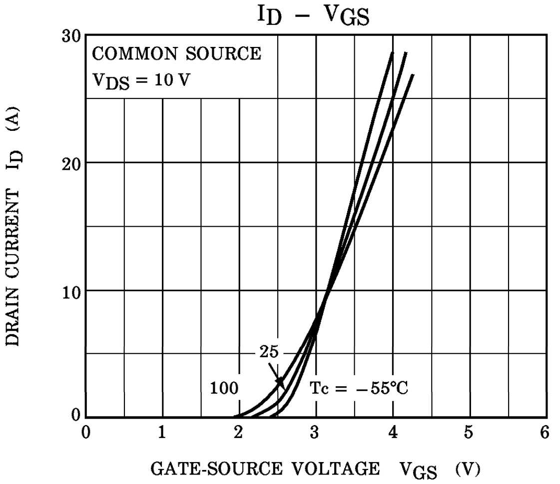
I_D – V_{DS}



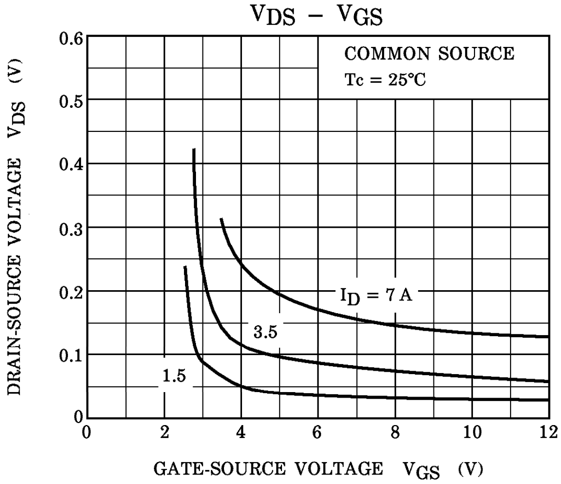
I_D – V_{DS}



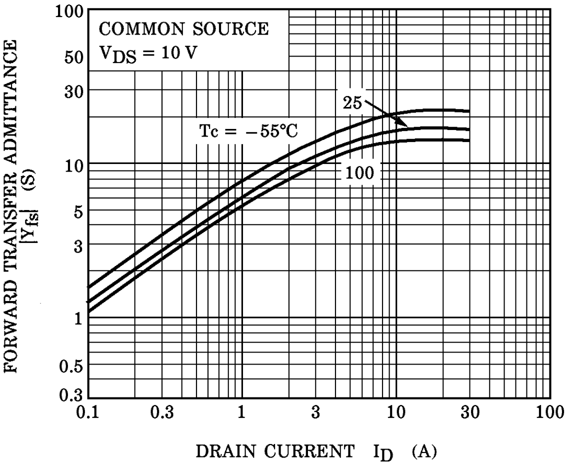
I_D – V_{GS}



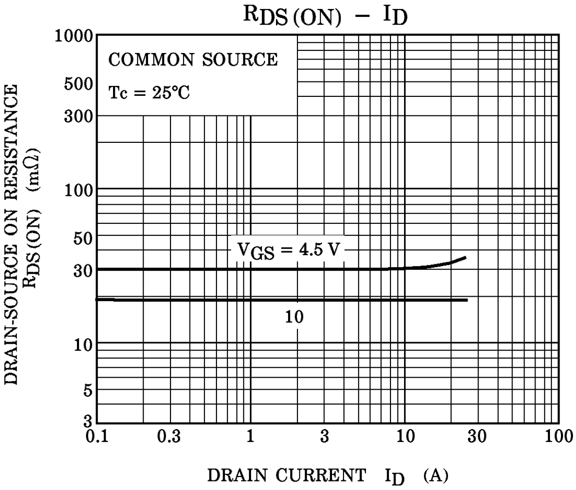
V_{DS} – V_{GS}



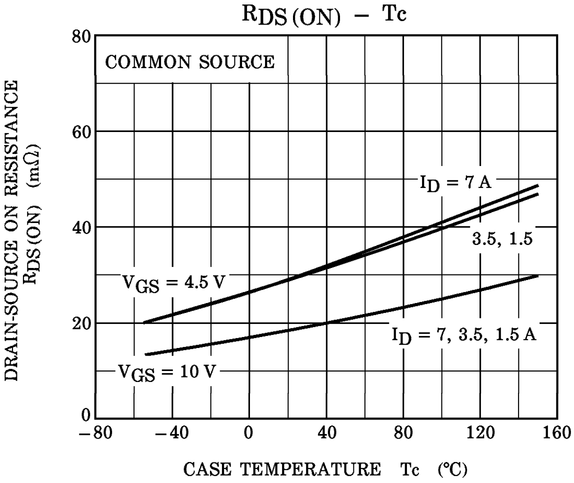
$|Y_{fs}|$ – I_D



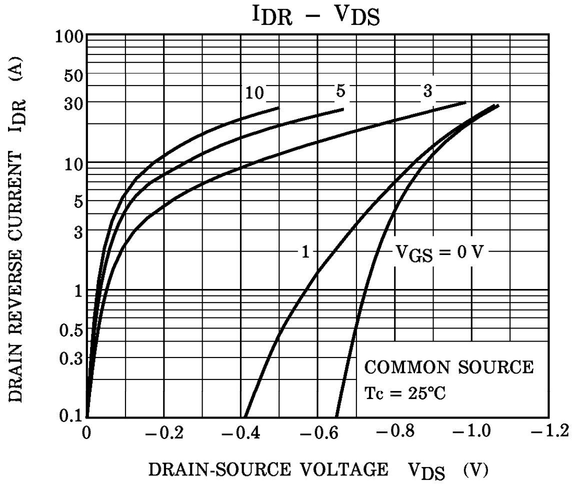
$R_{DS(ON)}$ – I_D



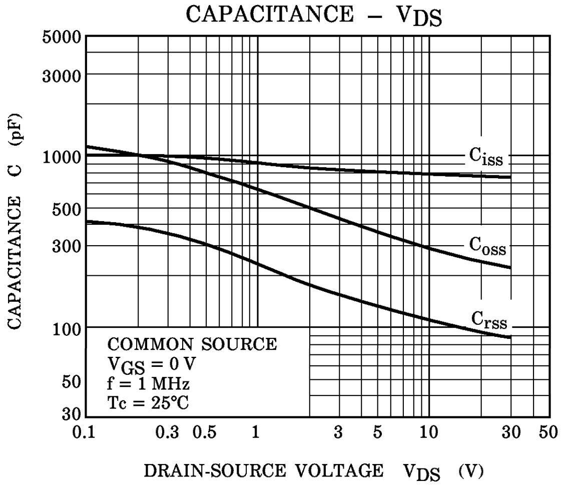
$R_{DS(ON)}$ – Tc



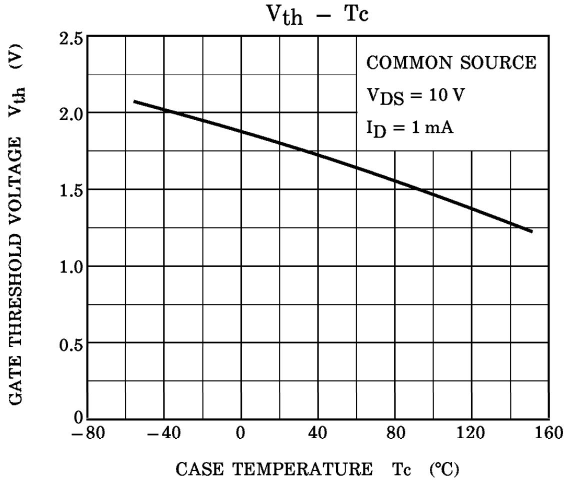
I_{DR} – V_{DS}



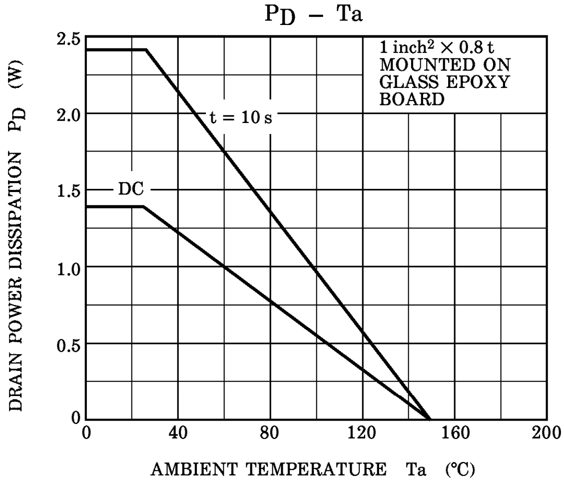
CAPACITANCE – V_{DS}



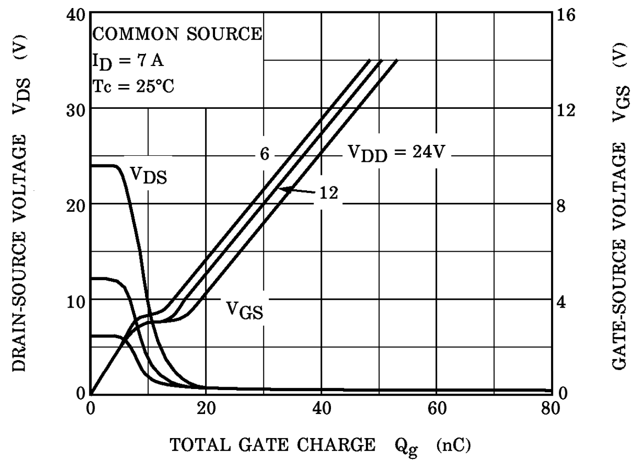
V_{th} – Tc



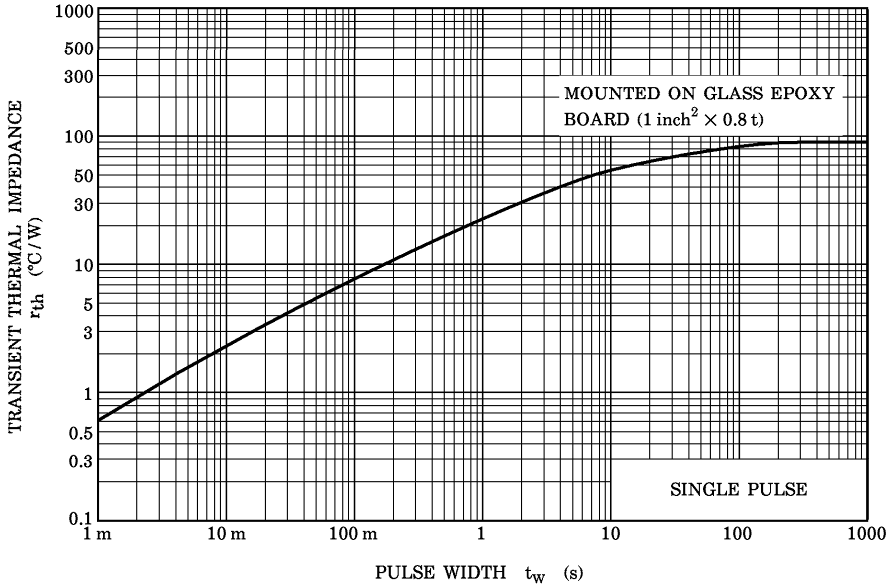
P_D – Ta



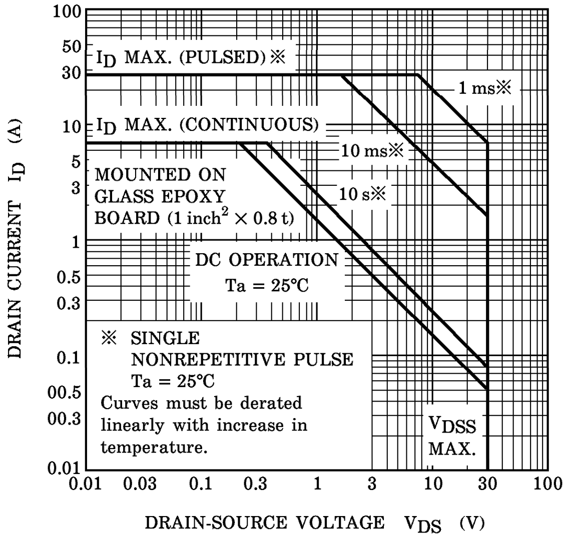
DYNAMIC INPUT / OUTPUT
CHARACTERISTICS



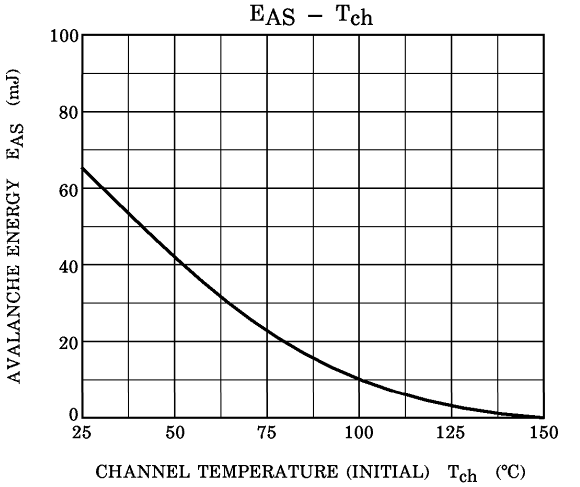
r_{th} – t_w

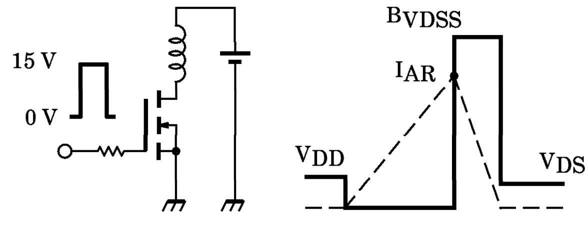


SAFE OPERATING AREA



E_{AS} – T_{ch}





TEST CIRCUIT WAVE FORM

Peak $I_{AR} = 7$ A, $R_G = 25\ \Omega$
$V_{DD} = 24$ V, $L = 1.0$ mH

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{B_{VDSS}}{B_{VDSS} - V_{DD}} \right)$$